

Rhodora

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NEW ENGLAND BOTANICAL CLUB

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MERRITT LYNDON FERNALD, Editor-in-Chief

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JAMES FRANKLIN COLLINS
CHARLES ALFRED WEATHERBY } Associate Editors
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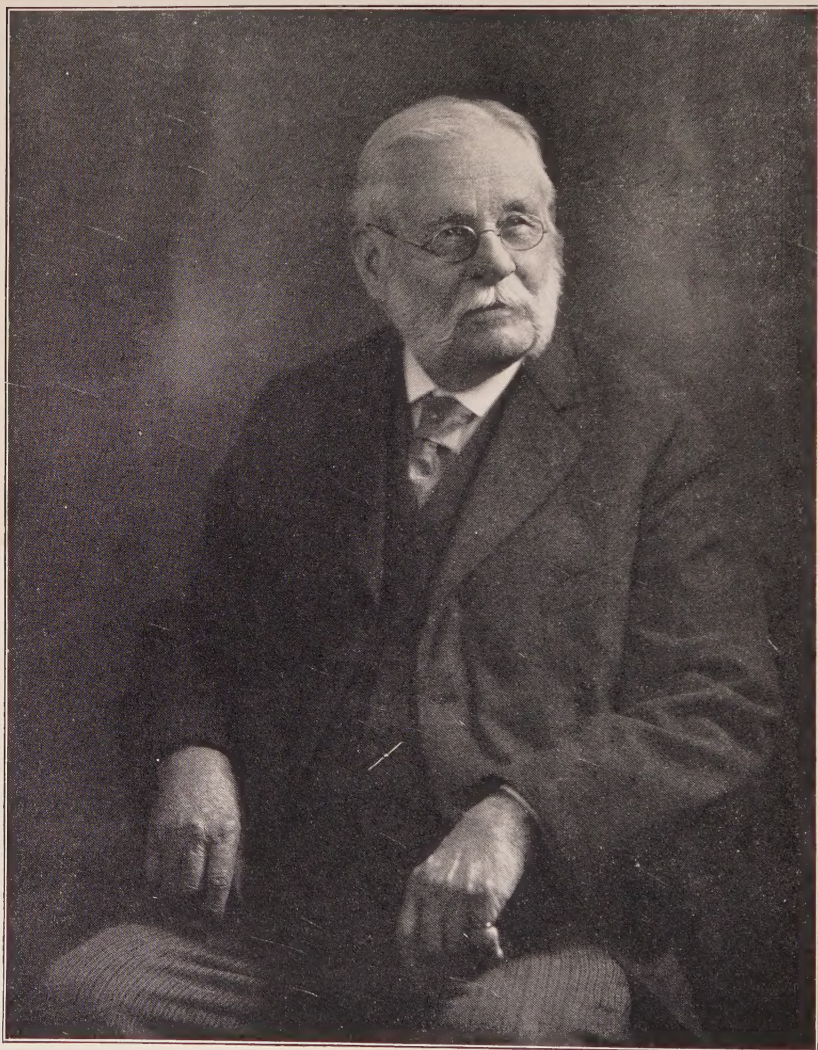
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*Yours Sincerely,
J. H. Churchill*

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JOSEPH RICHMOND CHURCHILL

CLARENCE HINCKLEY KNOWLTON

(With Photographs)

At the time of its organization, December 10, 1895, the New England Botanical Club was especially fortunate in securing as charter members a substantial and active group of amateurs, as well as the professional botanists of the period. George E. Davenport, Edward L. Rand, Walter Deane, Honorable Joseph R. Churchill, Frank S. Collins, Nathaniel T. Kidder, Dr. George G. Kennedy, Emile F. Williams, Edwin Faxon and Charles E. Faxon, and Lorin L. Dame; these were a group of business and professional men deeply interested in botany as an avocation. Such men would have brought strength to any organization. Most of them lived for many years to share in the interests of the Club and to promote its welfare.

It is to commemorate the life and interests of one of these men that this biographical sketch has been prepared. Joseph Richmond Churchill was born in Dorchester, Massachusetts, July 29, 1845. He was the son of Asaph Churchill, lawyer and banker, descendant of an old Plymouth family. His school life was uneventful. As a youth he became an ardent collector of insects, and devoted much of his leisure to that fascinating pursuit. Entering Harvard College, he received his A.B. degree in 1867. Science was beginning to receive some attention at Harvard, and during the latter part of his course young Churchill studied botany under Asa Gray.

An old book on student life in the college of those days says: "If a man had any accomplishment to perfect, or any fancy to please,

the Junior year used to be the time in which of all others he could carry out his plans. . . . If one falls in with a pair of students miles away from Cambridge, tramping through woods and over fields, collecting specimens of plants or minerals or insects, they are sure to be Juniors—complacent, dignified, happy Juniors. At least, it used to be so in those days." I like to think of young Churchill as such an energetic Junior.

After finishing the Law School course at Harvard in 1869, the young man was admitted to the bar and began the practice of law in partnership with his father, in Boston. On January 9, 1871, Governor Claflin appointed the young lawyer a justice of the Municipal Court, Dorchester District of Boston. Some comment was made at the time on account of the youth of the new Judge, but Judge Churchill assured his critics that he would endeavor to surmount that difficulty, and he did so successfully, serving for sixty consecutive years, and retiring on the anniversary of his appointment. Dorchester was a quiet New England suburb in those days, with a population of 12,000 people, but at the time of his retirement it had a population of 187,000, with all the complicated problems of modern urban life. The Judge grew with his position, and administered his office with unsurpassed dignity.

The appointment made it possible for Judge Churchill to marry. He had become engaged to Mary Cushing, daughter of Dr. Benjamin Cushing of Dorchester, and the wedding took place on February 21, 1871, soon after the appointment. Dr. Cushing built a house for the young people beside his own, on Meetinghouse Hill in Dorchester, and they made it their lifelong home. Three children were born to them, one of whom survives the Judge, Dr. Anna Q. Churchill, who is Professor of Microscopical Anatomy at Tufts College Medical and Dental School.

As his private legal practice Judge Churchill specialized in mortgages, and became a recognized expert. He idealized the mortgage as a means of grace for the mortgagor working for a home of his own, and as the best possible investment for the conservative investor. When the Massachusetts Coöperative Bank was organized in Dorchester he became its first president, and held the office for the rest of his life, more than 25 years. He also held the first shares ever issued by the bank.

Although Churchill studied botany at Harvard under Asa Gray,

he did not begin an herbarium at that time. In 1869, after explaining the relationship between columbine and buttercup to his interested fiancée, he began his collection by pressing both plants. About five hundred species were analyzed by the young couple during their engagement. Like many other amateurs, Judge Churchill began to mount his specimens on small sheets till he had about a hundred of them, some of which are still in existence. The oldest of these is *Oxalis Acetosella* from Campobello, in 1867. Then, after consultation at the Gray Herbarium, he adopted the standard size recommended by botanists there. He aimed to collect everything with his own hands, and did not care for exchanges. His idea was to go to the place where the flower grew and collect it there himself. In this way he built up an herbarium of 13,313 sheets, 146 of which were collected in 1932, the 87th year of his life. The Judge was very particular about the quality of his specimens. He collected them with great care, and spent many happy hours in putting them into press, and in straightening out leaves and petals.

The ultimate aim of this ardent collector was to collect with his own hands every species and variety listed in the area covered by Gray's Manual, but he often made excursions into outlying territory. The first real collecting trip away from home was in 1873 to find the saxifrages near Willoughby Lake in northern Vermont, where many inconveniences were suffered by the young couple in their primitive quarters. In fact, Mrs. Churchill often said that their vacations were always planned with some botanical objective, and often took them far from the comforts of home and of good hotels.

The island of Nantucket was a favorite place, visited again and again with most pleasing results. Berkshire County also attracted him early, and he first explored the fascinating region around Williamstown and Mt. Greylock. Later vacations took him to Lanesboro, near the center, and to Sheffield in the southern part of the county. But best of all places in Massachusetts he loved the Blue Hills where he had roamed as a boy, and they never failed to interest him. Two delightful summers were spent with his friend Charles Francis Jenney, Federal Judge, ornithologist and botanist, on the island of Monhegan, off the Maine coast.

Outside of his own state he liked Virginia best, and made many visits there, often in the spring. He loved especially the region around Norfolk, for in addition to botanical attractions at Virginia Beach

and elsewhere it was easy for him to visit Hampton Institute and listen to the negro spirituals as sung by the students there. This music held a peculiar charm for him. He also botanized much in Richmond and along the James River, at Lexington, the Natural Bridge and elsewhere in the Old Dominion. Insects and poison ivy disturbed him not, and a hot summer day held no terrors for him. Once at Kingston, Jamaica, when even the negroes were carrying parasols to protect them from the sun, he walked down the street in the early afternoon, and on his return remarked, "This is the only time I have ever been really warm enough."

The regions at Baltimore, Maryland and Rehoboth, Delaware, of Tryon and Wilmington, North Carolina, Beaufort, South Carolina, Lookout Mt., Tennessee, Jacksonville and Tampa, Florida, were other southern places visited and explored.

"No Trespassing" signs were no deterrent to the Judge's botanical activities, but on one of his last visits to the Chicago region he was much hampered by the walls and fences which accompanied these signs. It was not till he had transferred himself to Lake Maxinkuckee in Indiana that he was satisfied with the conditions for collecting. One noteworthy visit to St. Louis in early summer was especially delightful. Dr. Jesse M. Greenman of the Missouri Botanical Garden arranged numerous botanical excursions which proved most satisfactory. The Judge's long friendship with Dr. Greenman had much influence with him when he finally decided to will his herbarium to the Garden.

Judge Churchill often persuaded other botanists to accompany him in his travels, and always made new friends. His herbarium, growing thus during more than sixty years, became a veritable storehouse of pleasant reminiscences of people and places.

Farther west were journeys to Madison, Wisconsin, Sault Ste. Marie, to Colorado, and two memorable visits to the Yellowstone National Park, the latter in 1930. The venerable Judge with his official permit to collect specimens, frequently delayed the starting of the bus, as he enthusiastically lingered to seize some especially attractive plant. He steadfastly refused to visit California, on the ground that it was not wild enough for his purposes.

In Canada there were many trips to Lake Memphremagog in Quebec. Rivière du Loup, the Bonaventure River in Gaspé, Bic and Lac Tremblant, Cape Breton and Prince Edward Island were also visited and explored.



Upper: JUDGE CHURCHILL IN THE TYROL, 1913.
Lower: JUDGE CHURCHILL ON NANTUCKET, 1916.

Two European journeys in 1907 and 1913 brought many botanical opportunities, with collecting in England, Wales, Germany, Italy, the Alps and the Dolomites. The Blumenthal above Mürren in Switzerland gave him the greatest bliss of all his many botanical experiences. The memory of that wonderful flowery vale was always associated in his mind with the much-loved Pastoral Symphony of Handel.

Judge Churchill enjoyed especially such field trips as were arranged by the Botanical Club from time to time, and seldom missed one of them. He did not look for easy assignments of territory on such occasions. At one time in his seventies he and the elderly R. W. Woodward of Connecticut chose to explore Breakneck Brook, as their share in the day's exploration, returning in fine condition with full boxes, to labor till late evening in getting the specimens into press. The Judge was a capital tramping companion. He was dignified and paternal in his bearing, but he was also vigorous, alert and persevering in the field. He had a quiet but by no means latent sense of humor. On one occasion, after walking along a mile or more of railway track with him, I reminded him of the Massachusetts statute by which vagrants against whom there is no other charge may be arrested for walking on the track. "Yes," said he, "that's the law, and I've often sent men up for breaking it. But I felt sorry for them. I like to walk on the railway track myself."

On one occasion a family that had been camping for some little time in Minot's Woods was brought into the Dorchester Court for vagrancy. "I suppose," said Judge Churchill, "that cases of this sort may be made of all of us who are addicted to camping in the summer. Of course we may not all be in such apparently straightened circumstances, or under such hard financial compulsion. But from the looks of the children they appear to be healthy, hearty and nice-looking children, who look as if they had enjoyed it. I therefore find the defendants not guilty."

In 1929 the Judge was criticised by a public official for his disposal of a drunken driver case. When the Judge was interviewed by the reporter, he said "The man is now in durance vile. We have got him off the roads. He is in jail, and I believe that the safety of the general public has been very well taken care of. What difference does it make whether he was sentenced to jail on the drunken driving complaint, or on any other complaint? He is in jail anyway."

The Judge used white labels for plants in the Gray's Manual area and the South, yellow labels for plants from beyond the Mississippi and blue labels for European specimens. He collected one or more duplicates of each plant when possible, and was very generous with them. He always saved one duplicate for his lifelong friend, Walter Deane. Thus, though his personal herbarium was bequeathed to the Missouri Botanical Garden, there are specimens of most of his important finds in the New England Botanical Club Herbarium or the Gray Herbarium. His plants are often cited by systematic botanists.

In 1887 he prepared a very accurate list of the plants growing in the town of Milton for inclusion in the town history. Later he made a careful study of *Leguminosae*, *Scrophulariaceae* and *Verbenaceae* as they occur in New England, and published checklists of them in RHODORA. He also wrote for RHODORA a most readable account of the excursion to Mt. Katahdin undertaken by five members of the Botanical Club in 1900. Other notes are scattered through the thirty-odd volumes of RHODORA. A most interesting article in September, 1921, tells of his discovery of *Cimicifuga racemosa* in Sheffield, Massachusetts, with a half-tone plate showing the good Judge in the midst of the vigorous plants, and quite dwarfed by the towering spikes around him. He later re-discovered a station for this plant in Bernardston, Massachusetts. In 1902 a strange *Scutellaria* which he had found at Ft. Fairfield, Maine, was named in his honor *Scutellaria Churchilliana* Fernald. By a clause in his will \$1000 from a trust fund will revert to RHODORA.

No account of our honored friend would be complete without reference to the music which meant so much to him. His mother (née Mary Buckminster Brewer) was most musical in her tastes, and he inherited his love through her. He had a fine tenor voice and belonged to the Cecilia Society and to the Handel and Haydn Society. He was a regular attendant at the Boston Symphony Concerts. He also became much interested in the Boston Music School Settlement, and often attended its concerts, which he greatly enjoyed. By the terms of his will a considerable share of a trust fund will revert to this Settlement.

Judge Churchill early learned to play the flute, and was often accompanied on the piano by Mrs. Churchill's sisters next door, Misses Susan and Annie D. Cushing. The marriage of Miss Annie D. Cushing to Dr. Edward D. Peters, an accomplished 'cellist, brought

another musician into the family. An instrumental trio was formed, with flute, piano, and 'cello, and every Sunday evening they played together. After the death of Dr. Peters, however, the Judge had no more heart for his flute, and put it away, though he still loved his music as dearly as ever. He often whistled a favorite air, Mendelssohn's Overture to the Fair Melusine, as he worked over his specimens.

The watchful care of his devoted wife and daughter eased many of the hardships of old age for him. One infirmity he really resented—the lameness which hindered him in his walking and made long tramps impossible, but fortunately this limitation was late in coming to him. He worked on his specimens in his sunny study, re-read his well-loved Dickens and Thackeray, and seized every opportunity to enjoy the music which was so dear to him. He was able to attend the annual meeting of the New England Botanical Club on Friday, February 3; he presided at the meeting of the Massachusetts Coöperative Bank the following Monday; and with his daughter attended the Tuesday afternoon Symphony Concert. A week later, as he was apparently recovering from a slight illness, he suddenly died, on February 14, 1933.

Judge Churchill and his wife were for many years members of the First Church in Dorchester (Unitarian). The funeral was held in the ancient meetinghouse. One of the most touching features of the service was the perfect rendering of Goin' Home and Swing Low, Sweet Chariot, melodies which the Judge had especially appreciated.

In botany, as in the law and in business, Judge Churchill was accurate and painstaking. With his insistence on self-collected specimens, and his zeal for travel to new places, he was an outstanding amateur. To him, however, there was real joy, as well as intellectual satisfaction, in all the necessary labors of field collector and student. The fields and woods gave him new zest for living, and the study of the plants he found brought him solace as well as happiness.

HINGHAM, MASSACHUSETTS.

NEW RECORDS FOR WORCESTER COUNTY, MASSACHUSETTS.—On August 21, 1933, at Worcester, I collected *Scirpus sylvaticus* var. *Bissellii*; the second record of the variety for Massachusetts.

Since the seventh edition of Gray's Manual, the variety had been

collected at Bolton, Massachusetts (*F. F. Forbes*) and at Townshend, Vermont (*L. A. Wheeler*).

At Paxton, June 10, 1933, I collected *Carex scorsa*; the first record for Worcester County.

Specimens have been placed in the Gray Herbarium.—EARL W. BEMIS, Worcester, Massachusetts.

NOTES ON THE FLORA OF THE STATE OF WASHINGTON—II

J. WILLIAM THOMPSON

IN the author's first paper¹ a few errors in the description of the new species of *Erigeron Thompsoni* Blake were detected too late to be included in the *Errata* of volume 34. They are:

Page 238, line 24. For *descrescentia*, read *decrescencia*.

Page 239, line 3. For 2-6, read 2.6.

Line 4. For 3-8, read 3.8.

This paper is to deal with some new and interesting ranges of plants in this State which have been discovered in the course of exploration during the past two years.

FRITILLARIA CAMTSCHATCENSIS (L.) Ker-Gawler. Hultén² has recently given us an interesting account of this plant from its type locality. Abrams³ assigns it to "moist open woods, Canadian Zone; . . . along the coast to western Oregon." Mr. J. M. Grant gave the author a specimen from the "tide flats near Marysville," which locality seems incredible. Last summer the author found it in a mountain meadow back of the famous Big Four Inn, in the Cascade Mountains of Snohomish County, at about 1000 meters, *Thompson* 8778, which definitely places it in the Canadian Zone in open timber or in cold mountain bogs, in regions covered several feet deep in snow until early summer. There were 2-4 flowers on a stalk, averaging 3.

TRILLIUM PETIOLATUM Pursh. Piper⁴ cites collections of this peculiar *Trillium* from Spokane and Pullman, both in the extreme eastern part of Washington. The author has seen it in abundance along Catherine Creek near Union, Oregon. In 1931, while bota-

¹ RHODORA 34: 236 (1932).

² Eric Hultén. *Flora of Kamtchatka*, 1: 243 (1927).

³ Abrams. *Ill. Fl. Pac. States*, 1: 423 (1923).

⁴ Piper. *Flora of Washington*, 199 (1906).

nizing near Leavenworth, Chelan County, the author found it along a wooded creek bottom at the eastern base of Tumwater Mountain, *Thompson* 6444, which extended its range westward approximately 200 miles to the central part of the State.

CYPRIPEDIUM PARVIFLORUM Salisb. This widely distributed Lady's Slipper has been found and reported from near Spokane. In 1932, Mr. Chas. B. Fiker of Omak sent the author several specimens, *Fiker* 665, accompanied by the following ominous label which read: "In wet ground, in thickets, among poison ivy and rattlesnakes, protected from stock grazing, in the vicinity of Omak Lake, 15 May 1932." Mr. Fiker later told the author that a big rattler struck his boot while he was collecting this, and "for the sake of peace and safety" he had to kill the snake. The author thinks it is too bad that more of our rare plants do not use this method of protection from "mountain maggots (sheep)" and unscrupulous flower diggers! This station extends the range about 150 miles farther westward.

ISOPYRUM HALLII A. Gray. This interesting member of the Ranunculaceae was originally found along mountain streams in the foothills bordering the Willamette Valley, Oregon. The author has found it there twice: In the wooded gorge below the scenic Silver Creek Falls, Marion County, and at the head waters of Wilson River in Tillamook County. While on a brief trip just south of Elbe, Lewis County, the author found it in abundance along a stream at the foot of Storm King, and *Thompson* 8604 seems to constitute a first record for the State of Washington.

AQUILEGIA VULGARIS L. While making a trip to the northeast corner of Mount Rainier in 1931, the author noticed a peculiar *Aquilegia* growing along the newly made road through the deep firs and miles from the nearest residence. It seemed very plentiful and scattered along the roadside for several miles, and a generous collection of it was made. It proved a baffling case for an isolated botanist, and a specimen was submitted to Dr. Edgar Anderson who reported that it was apparently *A. vulgaris* \times *olympica*. This is an interesting find for both its pedigree and its unusual remote location along the new road to Yakima Park, Mount Rainier, near the entrance to the Park boundary, *Thompson* 7209. No other species of *Aquilegia* was found that day.

RANUNCULUS COOLEYAE Vasey & Rose, Contr. U. S. Nat. Herb. 1: 289, pl. xxii (1893); see colored plate in Harriman Alaska Expedition, vol. I: facing page 254.

The finding of this species on the crest of a mountain peak in the extreme southwestern part of the Olympic Mountains has been one of the biggest surprises of the author's career as a botanist. Never will he forget the hard trip of ten long weary miles of mountain trail which began near sea level and wound up and down and around until it reached the summit of Mount Col. Bob at 4750 feet. The trip began before daylight. It soon began to get foggy and all day the lower wooded slopes reminded one of approaching dusk. When the summit was reached, the sun was shining brightly, but everywhere below was a sea of fog and clouds. To the north the crown of Mount Olympus was thrust up through this sea like a rugged enchanted island. Occasionally a great mass of fog would suddenly detach itself from the mass below and come swishing upward to engulf everything for minutes at a time. With the thoughts ever uppermost in mind of the long ten miles back to camp that night, the author went hastily to work to explore the crest, and in a few minutes had picked up the following rare species: *Polystichum Andersoni*, *Poa stenantha*, *Carex circinata*, *Lloydia scrotina*, *Thlaspi glaucum*, var. *pedunculatum*, *Pinguicula vulgaris*, *Synthyris schizantha*, and *Erigeron Coulteri* Porter. The *Lloydia* grows in the crevices of cliffs on the northern side, and while the author was collecting this for the first time, a brilliant yellow buttercup attracted his attention. The snow had melted away from the cliff for about twenty feet. Right against the cliff, the buttercup was passing from flower to fruit, and down toward the snow a few feet away, it gradually diminished in stage of growth until it was just coming up where the snow left the ground bare as it receded away from the cliff.

The author hastily gathered a few specimens in different stages and began a reluctant return towards the distant camp. It did not fit into any of the western floras, and I submitted a specimen to Mr. Lyman Benson who is studying the group for Abrams' Illustrated Flora of the Pacific States. His first impression was that it was new to science, but on thorough investigation, he was surprised to find that it was *Ranunculus Cooleyae* of Alaska—but what a jump in range!

It was originally named for Prof. Grace Cooley of Wellesley College who discovered it while spending a vacation at Juneau, Alaska, in 1891. The next year Gen. Funston found it in the St. Elias Alps above Disenchantment Bay. Dr. Greene, that incomparable splitter,

placed it in the genus *Kumlienia* with another California buttercup; but conservative botanists prefer to let it remain a *Ranunculus*.

The author's collection, *Thompson* 7236, is the first record of this rare buttercup for the United States.

DICENTRA UNIFLORA Kell. This dainty wee bleeding-heart has a wide range but because it is so small and blooms so early, it is seldom found. Mr. Clarence B. Seely, a promising young collector, found it last spring growing on the precipitous slopes of the picturesque Tumwater Canyon near Leavenworth, Chelan County. Prof. Flett and Mr. Suksdorf report collections from Mount Adams. This collection of Mr. Seely's extends the range considerably northward in this State, and at quite a low altitude of less than 250 meters; it is represented in the author's herbarium as *Seely* 132.

SPIRAEA CINERASCENS Piper. (*Luetkea cinerascens* Heller; *Petrophytum cinerascens* Rydb.). This plant was originally found in the crevices of basaltic cliffs now known as Ribbon Cliff near where the road leaves the Columbia River to pass around the south end of Lake Chelan. It was found by Mr. Elmer in 1897, and not since, as far as the author knows. But in 1932, while driving along the cliff road a few miles north of Wenatchee, great patches of this rare *Spiraea* were found hanging from the bare cliffs. It prefers the shady side of the rocks, but even at that, the sun beats down there in the summer time at a terrific heat of about 130° F. It blooms quite late for such a warm situation, middle of August, and where it gets the moisture to sustain life is a mystery to the author. Its near cousin, *Spiraea Hendersoni*, also grows in the crevices of cliffs, but in a region of dense fogs and winter snows. The collection is *Thompson* 8526.

GEUM RIVALE L. This circumpolar plant has its range given in the North American Flora 22⁵: 407 as follows: "In swamps and low ground, from Labrador and Newfoundland to New Jersey, Missouri, New Mexico, and British Columbia; also in Europe and Asia." Last summer the author found it growing sparingly in a low alpine meadow between Tonasket and Republic in Okanogan County, *Thompson* 8637, associated with *Petasites sagittata* and *Populus tremuloides*. This is the first record for the State.

ACOMASTYLIS DEPRESSA Greene. The type locality of this plant is Mount Stuart (not Stewart, as in North American Flora 22⁵: 413), and one of the big thrills of 1931 was to refind this plant several times on various slopes of Mount Stuart. The author was camped on the

western base of the mountain, and when working up the almost perpendicular cliffs, he found a quantity of it growing in the shade of a moist nook at about 6000 feet. Later on in the day it was seen on the dangerous north side in deep shade, and again near the summit where it would have been death to try to reach it. It is a very showy plant when in bloom and reminds one of a cross between a strawberry and a *Potentilla*. The collection was distributed under the name of *Geum Rossi*, the original collection having been cited by Piper¹ as *Sieversia Rossi*. *Thompson* 7628 is the second known collection.

VIOLA SHELDONI Torr. The type was found at Yuba, California. It is common in Jackson and Josephine Counties, Oregon, and Suedorf found it in the White Salmon Valley, in this State. The author found it growing under the half prostrate branches of *Purshia tridentata* on a warm yellow-pine slope west of Cle Elum, Kittitas County, and *Thompson* 5949 extends the range many miles farther north.

HACKELIA VENUSTA (Piper) St. John. This handsome Borage was found in the granitic slopes of Tumwater Canyon near Leavenworth by Mr. I. C. Otis. Prof. Piper described it as *Lappula venusta*,² but when *Hackelia* was restored, Dr. St. John³ placed it in the right group. Dr. St. John revisited the locality whence it came, but was unable to find it. The author visited the locality on 21 May 1931, and found what he thought at first was a large *Phlox*, but which turned out to be the above. A large collection was made and sent to the various herbaria. A few weeks later, the author collected it in fruit, collections being *Thompson* 8266 and 8422, both from the exact type locality. Living plants have been sent to the New York Botanical Garden, where it is hoped that it will flourish and be introduced into cultivation in the near future.

CRYPTANTHA THOMPSONII I. M. Johnston, Contr. Arn. Arboretum **3**: 88 (1932).

This recently described species is one of several recently published, or in process of being published, and is included here perhaps from vanity on the part of the author; but it is quite a thrill to find such distinctive new species. This plant is another one of the several endemics of the Wenatchee Mountains around Mount Stuart, occurring below obsidian cliffs at the head of Beverly Creek, Mount Stuart region, *Thompson* 7663 and 8742.

¹ Piper. *Flora of Washington*, 344 (1906).

² *Proc. Biol. Soc. Wash.* **37**: 93 (1924).

³ *Research Stud. St. Coll. Wash.* **1**: 104 (1929).

ERIGERON LONCHOPHYLLUS Hook. Dr. Blake¹ gives the range of this species as "Saskatchewan to British Columbia, Nevada, and Colorado." Prof. M. E. Peck has found it in Oregon, and last summer the author found it in an open boggy creek bottom near Tonasket, Okanogan County, *Thompson* 8665.

ERIGERON ACRIIS L., var. ASTEROIDES (Andrzej.) DC. Dr. Blake gives the range for the species as follows: "Quebec to Alaska, southward to New Brunswick, Michigan, Colorado and Utah." Two widely distant places in this State add it to its flora; base of Mt. Angeles, *Thompson*, 7358 and *Fiker* 1079 from Okanogan County.

CLEVELAND HIGH SCHOOL, SEATTLE.

THE SPORES OF THE GENUS *LYCOPODIUM* IN THE UNITED STATES AND CANADA²

L. R. WILSON

(Plates 275-277)

THE occurrence of certain *Lycopodium* spores as fossils in peat has led to the study of the modern spores of this genus in the United States and Canada. The study has shown that the various *distinct* species have characteristic spore types, which make their identification as fossils possible; also it has suggested the use of spores as another criterion of species and a method of determining phylogenetic relationships.

MATERIALS AND TECHNIQUE

The spores studied were secured from fresh mature specimens of most of the American species of *Lycopodium* as well as from herbarium specimens from various parts of the world. Many slides were made of spores of each species and from these typical examples were chosen. A slight variation in size, shape, and pattern is found among the spores of the same species, but this is due mostly to the age of the spores (maturity and storage), the size of the sporanges from which the spores were taken, and the treatment given in preparing them for study. The smallest sporanges of a strobilus often have what appear to be immature or abnormal spores. Severe treatment will often

¹ Contr. U. S. Nat. Herb. 25 (1925).

² Published with aid to RHODORA from the National Academy of Sciences.

collapse the spore or destroy its diagnostic characters so the preparation must be uniformly and carefully made.

It is possible to determine a number of *Lycopodium* species without subjecting the spores to any clearing process, but others (*L. Selago*, *L. lucidulum*, *L. annotinum*, *L. cernuum*, *L. obscurum*, *L. inundatum* and *L. alopecuroides*) have a material on the inside of the walls, which gives the appearance of papillation and must be removed in order that the species be definitely identified. The composition of this removable material has not been determined, but it may be a type of stored food. The following schedule was used in preparing the spores: in a drop of 10% potassium or sodium hydroxide on a slide the spores were boiled for ten seconds, then removed with a scalpel or pipette to distilled water in a watch glass, washed several times by decanting and renewing water, after which they were mounted in glycerine jelly. Stains, such as gentian violet or Sudan 111, may be used, or green, red, and yellow light filters may be used instead to aid in studying the exine features.

The spores were studied under a compound microscope, using a 3 x ocular and a 6mm. objective. The drawings were made with the aid of a camera lucida and show only surface features. The surface upon which the germinating slits are seen is called the apical surface and the basal surface is that opposite. Direct views of both basal and apical surfaces have been drawn and have proved adequate for comparison except in the apical-surface-views of *L. inundatum*, *L. alopecuroides* and *L. carolinianum*. These species have concave apical sides that could not be rendered very satisfactorily; however, the ornamentation has been correctly recorded.

DISCUSSION

By the type and ornamentation of *Lycopodium* spores it is not only possible to distinguish the various species, but also to group the North American forms into sections, which coincide with those that have been made on other morphological structures.

If the American and Canadian species of *Lycopodium* be grouped according to their gross morphological relationships the following three groups will be made: (1) species with a primitive strobilus having unspecialized green sporophylls (*L. Selago* and *L. lucidulum*); (2) species with a slightly to greatly advanced strobilus and slightly to greatly specialized sporophylls (*L. alopecuroides*, *L. inundatum* and

L. carolinianum); and (3) species with a distinct strobilus and highly specialized yellow, scale-like sporophylls (*L. cernuum*, *L. annotinum*, *L. obscurum*, *L. clavatum*, *L. complanatum*, *L. sabinaefolium* and *L. alpinum*). These progressive evolutionary movements have been discussed more fully by Schaffner,¹ and the present findings agree very closely with the line of development described by Dr. Schaffner. There is, however, one minor point of difference found when a study is made of the peduncled strobilus. This will be discussed under group three.

In the first group, composed of *L. Selago* and *L. lucidulum*, the spores are characteristically triangular with concave sides, when observed either on the apical or basal surface (see drawings). The spores of these species differ in size and quality of papillation. Usually *L. Selago* spores are about 5 μ larger in diameter than those of *L. lucidulum*; also, the papillation on the exine of the latter is finer. These spores must be treated as directed above or the material on the inside of the spore wall will appear as papillae masking those on the exine. In *L. Selago* these "false papillae" are usually quite regular while they are not always so in *L. lucidulum*. In an earlier paper² describing this group only the "false papillae" were described. With some practice it is possible to distinguish the two species without clearing the spores, but it is advisable to use a uniform technique. The drawings of these two species do not show the "false papillae."

Lycopodium inundatum, *L. alopecuroides*, and *L. carolinianum* compose the second group of *Lycopodiums* and, like the first, they have characteristic spores. The spores are larger than those of the other species. The germinating slits occur in a furrow that is unornamented. These three species appear to represent an ancient group. The probable antiquity of *L. carolinianum* has been pointed out.³ *L. alopecuroides*⁴ appears to be confined to the Atlantic Coastal Plain and *L. inundatum*, while widespread in boreal regions, is probably a more recent offshoot from the same stock.

Lycopodium carolinianum may be considered by some investigators as belonging to the next group, but though the sporophylls of this

¹ Schaffner, J. H. 1931. *Characteristic Examples of accumulative progressive evolutionary Movements*. Ohio Jour. Sci. 31: 346-349.

² Wilson, L. R. 1932. *The Identity of Lycopodium porophyllum*. RHODORA. 34: 169-172.

³ Fernald, M. L. RHODORA 33: 46. 1931.

⁴ *Lycopodium alopecuroides* is sometimes treated as a variety of *L. inundatum*, but the spore differences would indicate that they are distinct species.

species are yellow and highly specialized, the strobilus distinct upon a scaly peduncle, and the leaves of the stem of two types, the relationship suggested by the spores, the type of rootstock, and the solitary cone upon a peduncle are here considered more fundamental than those characters which would place the species in the next group.

The spores of The Atlantic Coastal Plain species have been referred to as having a size relationship; also the basal surface is found to be wavy-reticulate. In a fourth species (*L. cernuum*) the same wavy reticulation appears. The spore is not, however, nearly the size of those of the other species, but is the smallest of any belonging to the genus in this country or Canada. It would be assuming too much, so few species of the genus having been studied, to construct a phylogenetic series that might illustrate the relationship of one type of *Lycopodium* species to another. Probably the greatest obstacle is the fact that the genus is of such great age that the species living today may represent the ends of long lines of evolution upon widely divergent branches. It is, however, interesting to note the geographic and spore-type relationship of the Atlantic Coastal Plain species. Here we have an ancient physiographic province with a type of habitat that may be of similar great age, and a flora upon it that suggests antiquity. That the Atlantic Coastal Plain species of *Lycopodium* should show relationship by their spores is of considerable interest.

In the third group there are numerous spore types. In this respect it is unlike the others, for *L. cernuum*, *L. annotinum*, and *L. obscurum* appear to be less closely related to each other than are the species within each of the two previously discussed groups. *L. obscurum* spores are the nearest in type to those of *L. clavatum* and the *L. complanatum* group, but differ from them in having an extremely delicate reticulation on the apical surface and coarser reticulation on the basal surface. In other words they have two distinct types of reticulation, while the others have only one. The two last named forms appear to be related to one another if spore type is a criterion. *Lycopodium clavatum*, however, may be separated from the *L. complanatum* group by its smaller reticulation.

The spores of *L. complanatum*, *L. sabinacifolium*, and *L. alpinum* at first appeared to be distinguishable from one another by diameter and the extent to which the reticulation nears the junction of the germinating slits, but these characters apparently are not constant and one is inclined to go back to the suggestion of Underwood¹ and

¹ Underwood, L. M. 1882. Our Native Ferns and their Allies, ed. 2. pp. 118-119.

consider *L. alpinum* and *L. sabinaefolium* as forms of *L. complanatum*. If we interpret this condition of the spores as evidence for close relationship within the Lycopods, it is possible that in this section of the genus is a group of plants that are either extreme ecological forms or which have evolved only slightly along certain trends. Recent treatments would favor the latter possibility.¹

Dr. Schaffner² considers the presence of a peduncle an advance over the sessile type of strobilus, which in all probability is a correct assumption. However, if the three species, *L. complanatum*, *L. sabinaefolium*, and *L. alpinum*, are studied it will be observed that though they are obviously related in their spores and foliage *L. complanatum* has a stout, scaly peduncle, *L. alpinum* has a leafy branch-like peduncle, and *L. sabinaefolium* is intermediate between the two, having a slender peduncle of varied length and with sparse spreading scales. It appears from this that the structure and length of the peduncle may be variable within a group. This is further emphasized in *L. clavatum* and its varieties, for here there is a range in length of the peduncle from less than two centimeters to more than fifteen. The habitat of the plant appears to have much to do with the length to which the peduncle will grow, for among those plants occurring at high altitudes or in the extreme north will be found these short-peduncled forms.

No distinction could be made between the spores of *L. complanatum*, *L. flabelliforme* and *L. tristachyum*. In Wisconsin these three forms merge into one another and appear to be ecologically controlled. Victorin³ has suggested hybridization for the origin of many forms in this group, but this has never been demonstrated, and the difficulties which accompany the germinating of *Lycopodium* spores make such experimentation practically impossible.

The following synoptic key is given as a brief review of the spore characters, the order of species being based upon spore relationship and gross morphology, and is subject to revision as other species are studied.

¹ Through the kindness of Professor M. L. Fernald the writer has recently been able to examine many more spores of *Lycopodium alpinum*. Measurements have been made of these and graphed to show size as compared with *L. sabinaefolium* and *L. complanatum*. From this study it appears that the spores of *L. alpinum* are slightly different from the others. The details are being reserved for further study.

² Schaffner, J. H. l. c.

³ Victorin, Frère Marie-. 1925. *Les Lycopodiées du Québec*. Contrib. du Lab. de Bot. de l'Univ. de Montréal. No. 3. p. 77.

The writer wishes to express his appreciation to Dr. N. C. Fassett for his kindly criticism and interest and to Dr. G. S. Bryan for suggesting a terminology for spore characters.

KEY TO THE SPECIES OF LYCOPODIUM IN THE UNITED STATES AND CANADA

- A. Spores distinctly triangular and sides concave when seen on the apical surface; basal surface papillate; sporophylls unspecialized; strobilus primitive; plants gemmiparous; stems procumbent or erect; leaves flattened or appressed, little specialized. . . . B.
- B. Spores 32 μ or more in diameter; papillation of exine uniform, evenly distributed; leaves appressed or spreading, widest below the middle, margins entire; stems erect or slightly procumbent. . . . *L. Selago.*
- B. Spores 30 μ or less in diameter; papillation of exine delicate, often indistinct, sometimes irregular in distribution; leaves spreading, widest above the middle, margins serrate or entire; stems procumbent *L. lucidulum.*
- A. Spores triangular to round and sides convex when seen on the apical surface; basal surface reticulate; sporophylls slightly to greatly specialized; strobilus specialized; plants not gemmiparous; stems horizontal or erect; leaves flattened, incurved, spreading, appressed, fused, or reduced, little to greatly specialized. . . . C.
- C. Spores 43 μ or more in diameter, the germinating slits in a furrow, reticulation on the basal surface wavy; sporophylls green or yellow, slightly to greatly specialized; strobilus distinct and solitary upon a leafy or scaly peduncle; rootstock superficial, creeping; no erect branches; leaves flat, spreading or incurved. . . D.
- D. Apical surface of spores papillate; sporophylls green and but slightly specialized; peduncle leafy; stem-leaves nearly uniform in size. . . . E.
- E. Apical surface of spores with ridge-like rows of papillae extending to the edge of the unornamented germinating furrow, where the papillae are larger and irregular; sporophylls very slightly broadened at the base. . . . *L. alopecuroides.*
- E. Apical surface of the spores with uniformly distributed papillae except in the unornamented germinating furrow; sporophylls distinctly broadened at the base. . . . *L. undulatum.*
- D. Apical surface of the spores not papillate; sporophylls yellow and greatly specialized; peduncle covered with small scale-like bracts; stem-leaves of two distinct sizes. . . . *L. carolinianum.*
- C. Spores 36 μ or less in diameter, the germinating slits not in a furrow, reticulation on the basal surface angular or wavy; sporophylls yellow and greatly specialized; strobilus distinct, sessile or peduncled, one to several on a peduncle; rootstock subterranean or superficial with erect branches; leaves flat, incurved, appressed, fused, or reduced. . . F.
- F. Diameter of the spores 23 μ or less, reticulation on the basal surface wavy, apical surface unornamented; strobilus sessile; sporophylls small and spinulose; leaves linear and incurved. . . . *L. cernuum.*

- F. Diameter of the spores 28 μ or more, reticulation on the basal surface angular, apical surface unornamented or angular-reticulate; strobilus sessile or pedunculate; sporophylls large, not spinulose; leaves flat, incurved, appressed, or fused...G.
- G. Spores unornamented on apical surface; strobilus sessile; leaves flat or appressed; rootstock superficial.....*L. annotinum*.
- G. Spores with angular reticulation on the apical surface; strobilus sessile or pedunculate; leaves flat, incurved, or fused; rootstock subterranean or superficial...H.
- H. Reticulation on the apical surface finer than on the basal surface of the spores; leaves flat or incurved; rootstock subterranean; upright branches tree-like.....*L. obscurum*.
- H. Reticulation on the apical surface of the spores of the same quality as on the basal surface; strobilus sessile or pedunculate; leaves incurved or fused; rootstock subterranean or superficial; upright branches spreading or tree-like...I.
- I. Ridges of the reticulation appearing on the equator numbering 35 or more, on the apical surface the reticulation usually extending to the junction of the germinating slits; leaves incurved; rootstock superficial; upright branches two or three times divided but not tree-like.....*L. clavatum*.
- I. Ridges of the reticulation appearing on the equator numbering 30 or less, on the apical surface the reticulation usually not extending to the junction of the germinating slits; leaves fused at the bases and reduced; rootstock subterranean or superficial; upright branches usually tree-like.....*L. complanatum* group.

EXPLANATION OF PLATES 275-277

PLATE 275. Spores of *Lycopodium Selago* L., *L. lucidulum* Michx., *L. annotinum* L. and *L. cernuum* L.; FIGS. at left basal view, at right apical view.

PLATE 276. Spores of *L. inundatum* L., *L. alopecuroides* L. and *L. carolinianum* L.; FIGS. at left basal view, at right apical view.

PLATE 277. Spores of *L. obscurum* L., *L. clavatum* L. and *L. complanatum* L.; FIGS. at left basal view, at right apical view.

DEPARTMENT OF BOTANY,

UNIVERSITY OF WISCONSIN.

SOME TRANSFERS IN DIGITARIA AND PASPALUM

M. L. FERNALD

DIGITARIA FILIFORMIS (L.) Koeler, var. **villosa** (Walt.), comb. nov. *Syntherisma villosum* Walt. Fl. Car. 77 (1788). *D. villosa* (Walt.) Pers. Syn. i. 85 (1805).

I am unable to find clear morphological differences to separate *Digitaria villosa* from *D. filiformis*. The latter occurs farther north in the East, ranging from Alabama to Texas and Mexico, thence pushing north in the interior to Michigan, Illinois and Iowa, and east of the mountains to southern New Hampshire. It is usually, but not always, the lower and more slender of the two, with filiform culms 0.5–9 dm. high, with racemes 1–15 cm. long, the spikelets mostly in 3's and 1.5–2 mm. long. Var. *villosa* is often, but not always, coarser and taller (up to 1.4 m. high), with sheaths often more densely villous, the racemes sometimes more distant (up to 3 cm. apart) and 5–25 cm. long, the groups of spikelets usually more distant, and the individual spikelets 2–2.5 mm. long. None of these characters is sufficiently constant to indicate that the plant is a definite species. It ranges from Florida to Texas, northward to Kansas, Missouri, Illinois and Virginia.

PASPALUM CILIATIFOLIUM Michx., var. **Muhlenbergii** (Nash), comb. nov. *P. pubescens* Muhl. in Willd. Enum. Hort. Berol. 89 (1809). *P. Muhlenbergii* Nash in Britton, Man. 75 (1901). *P. pubescens*, var. *Muhlenbergii* (Nash) House, Bull. N. Y. State Mus. no. 243–244: 39 (1923).

P. CILIATIFOLIUM Michx., var. **stramineum** (Nash), comb. nov. *P. stramineum* Nash in Britton, Man. 74 (1901).

I fully agree with House, that there is no specific line between *Paspalum Muhlenbergii* and *P. pubescens*. Mrs. Chase's note, published at a later date by House, is to the point: "Mrs. Chase (in lit.) points out that *P. Muhlenbergii* Nash is so closely related to *P. pubescens*, that no combination of characters holds, though extremes look quite different."¹ Weatherby, in 1928, was "quite unable to distinguish between the New England plants determined . . . as *P. pubescens* and *P. Muhlenbergii*. . . . It appears necessary to unite the two under one species; and since *P. pubescens* is by far the earlier name and was (again according to information courteously furnished by Mrs. Chase) correctly interpreted by Nash, it must be used for the resultant group."² And in 1929, in her *North American Species of Paspalum*,³ Mrs. Chase merged the two outright.

Wiegand & Eames had gone ever further, taking up *P. ciliatifolium* Michx. (1803) for the species, to which they reduced outright *P. pubescens* and *P. Muhlenbergii*, saying rightly: "The separation of

¹ House, Bull. N. Y. State Mus. no. 254: 70 (1924).

² Weatherby, RHODORA, xxx. 134 (1928).

³ Chase, Contrib. U. S. Nat. Herb. xxviii. 83 (1929).

species in *Paspalum* and *Panicum* on the basis of degree of pubescence is to be regretted. Fluctuation of pubescence is, at most, of only varietal importance."¹ Although in 1928, in the discussion cited, Weatherby was "not yet prepared to follow them quite so far," I find myself, after struggling to get morphological differences, fully in agreement with Wiegand & Eames, except that I should recognize varietally the more strongly marked geographic trends. I should add *P. stramineum* to the series, as an inland variety showing a common response to semi-arid to arid inland conditions, a development of minute pubescence.

The three variations of *Paspalum ciliatifolium* are separated (somewhat unsatisfactorily) by the following tendencies:

Surfaces of leaf-blades glabrous throughout or between the long trichomes, not puberulent.	
Surfaces quite glabrous.....	<i>P. ciliatifolium</i> (typical).
Surfaces long-pilose or villous.....	Var. <i>Muhlenbergii</i> .
Surfaces minutely puberulent, otherwise either villous or non-villous.....	Var. <i>stramineum</i> .

Typical *P. ciliatifolium* occurs in dry or moist open places or in thin woods, from Florida to Texas, extending north to New Jersey, Tennessee, Missouri and Kansas. It is also in the West Indies and Central America. Var. *Muhlenbergii* extends farther north, to southern New Hampshire, southern Vermont, New York, Ohio, southern Michigan and southern Wisconsin. Var. *stramineum* is a plant of sandy soils in Texas, New Mexico and Arizona, extending north to Indiana, Wisconsin, Minnesota, Nebraska and Colorado.

That the three lack what some of us would consider fundamental specific differences becomes clear on comparing the descriptions of them and the beautiful illustrations of them in Mrs. Chase's monograph: *P. ciliatifolium* with "spikelets 1.9 to 2.1 mm. long, . . . minutely pubescent"; *P. pubescens* with them "1.7 to 2.1 mm. long, . . . glabrous, . . . rarely sparsely pubescent"; *P. stramineum* with them "2.1 to 2.2 mm. long, . . . sparsely to rather densely pubescent or sometimes glabrous." However, although *P. ciliatifolium* differs from *P. pubescens* in having spikelets "1.9 to 2.1," instead of "1.7 to 2.1 mm. long," "there are a number of specimens, otherwise typical or fairly typical *P. ciliatifolium*, in which the spikelets are only 1.7 to 1.9 mm. long."

As to pubescence, *P. ciliatifolium* is described with the "blades

¹ Wiegand & Eames, Fl. Cayuga L. Basin, 83 (1926).

. . . typically strongly ciliate . . . , but sometimes ciliate toward the base only, very rarely not at all ciliate, otherwise glabrous or pilose along the mid nerve below or minutely pubescent toward the apex, rarely throughout" and in some "the foliage is sparsely pubescent, approaching the less pubescent specimens of *P. pubescens*"; *P. pubescens* itself is defined with "blades . . . from sparsely to conspicuously pilose on both surfaces, sometimes minutely puberulent beneath the long hairs on the upper surface" but "This species varies in the amount of pubescence. . . . The following specimens [with an enumeration] have foliage less pubescent . . . , approaching the sparsely pubescent plants of *P. ciliatifolium*"; and *P. stramineum* is assigned "blades . . . puberulent on both surfaces, rarely obscurely so, and sparsely pilose as well, or the lower surface nearly or quite glabrous except for a few long hairs mostly along the mid nerve, the margins commonly papillose-ciliate."

When *P. pubescens* with spikelets 2.1 mm. long and "sparsely pilose" and with blades "less pubescent" is compared with *P. ciliatifolium* with spikelets 2.1 mm. long, "minutely pubescent" and with blades "sparsely pubescent" what is the SPECIFIC difference? When *P. stramineum* with spikelets 2.1 mm. long, "sparsely pubescent or sometimes glabrous" and with "blades . . . nearly or quite glabrous" is compared with *P. ciliatifolium* with "spikelets . . . 2.1 mm. long . . . minutely pubescent" and with blades glabrous where shall we look for SPECIFIC characters?

The situation in *Paspalum ciliatifolium* is rather closely parallel to that in other species: *P. laeve* Michx., with essentially glabrous sheaths and blades, passing to var. *pilosum* Scribn. (*P. plenipilum* Nash), with them strongly pilose, and by numerous transitions to var. *circularis* (Nash) Stone (*P. circularis* Nash), with more rounded and slightly larger spikelets; *P. pubiflorum* Rupr., with spikelets pubescent, passing into var. *glabrum* Vasey (*P. laevigatum* Scribn.), with them glabrous; *P. floridanum* Michx., with pubescent foliage, var. *glabratum* Engelm. glabrous or nearly so, glaucous and with racemes often longer. Parallel situations in *Panicum* are very numerous.

RANGE EXTENSION IN MISSOURI FOR *OPHIOGLOSSUM VULGATUM*.—In Missouri, as in many other states, *Ophioglossum vulgatum* is a rarity. Hitherto, this fern has been known in Missouri only from a

few of the lowland counties in the extreme southeastern portion of the state, namely, Bollinger, Stoddard, and Butler counties.

In the spring of 1933 the writer visited a region west of Foley, Lincoln Co., north of the Missouri River. This region is of exceptional botanical interest because of the occurrence here of a number of typical Ozarkian plants, ordinarily confined to the Ozark region south of or bordering the Missouri River, which reach their present known northeastern limit in the state.¹ In fact, this area is really a northeastern extension of the Ozarks both botanically and geographically. Sandy Creek, emptying only a few miles away into the Mississippi River, has eroded in this area a long and narrow ravine bordered by bluffs of the St. Peter sandstone of Ordovician age. The valley of the ravine harbours a varied and luxuriant growth of trees and shrubs, and bordering the banks of Sandy Creek occur numerous species common to alluvial soils and low ground, such as *Senecio glabellus*, which is here near its northern limit in the state. In these rich shaded woods along the stream in the floor of the sandstone ravine the writer discovered three plants of *Ophioglossum vulgatum*, of which two bore fertile sporophylls.

The discovery of this species in Lincoln Co. is an extension northward of approximately 150 miles over its previously known distribution in the state.—JULIAN A. STEYERMARK, Missouri Botanical Garden, St. Louis.

THE NAME OF THE AMERICAN LOTUS

M. L. FERNALD

NELUMBO **pentapetala** (Walt.), comb. nov. *Nymphaea pentapetala* Walt. Fl. Carol. 155 (1788). *Nymph. Nelumbo* Walt. l. c., not L. (1753). *Nelumbium luteum* Willd. Sp. ii. 1259 (1799). *Nelumbium pentapetalum* (Walt.) Willd. l. c. (1799). *Nelumbo lutea* (Willd.) Pers. Syn. i. 92 (1805). *Cyamus flavicomus* Salish. in Kon. & Sims, Ann. Bot. ii. 75 (1805). *C. pentapetalus* (Walt.) Pursh, Fl. Am. Sept. ii. 398 (1814). *C. luteus* (Willd.) Nutt. Gen. ii. 25 (1818).

Walter thought that he had specimens of two species: one, which he called *Nymphaea Nelumbo* (misidentified with the Old World species), was described

foliis peltatis undique integris, calyce quadrifido, corolla multiplici alba, loculis monospermis;

the other, differing only in number of sepals and petals, his new *Nymphaea pentapetala*, was similarly described

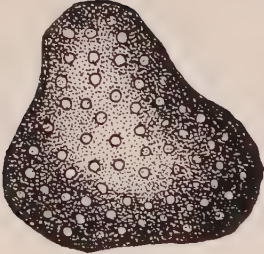
¹ Steyermark, J. A. Notes on Missouri Plants. RHODORA 35: 283-291. 1933.

foliis peltatis undique integris, calyce pentaphyllo, corolla magna pentapetala alba, loculis pericarpium monospermis.

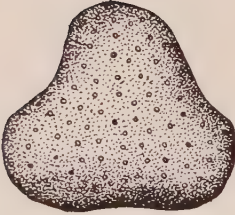
The number of sepals varies in our American *Lotus*, being either 4 or 5; the number of petals (5) would be unusual for our plant. Its petals readily fall, however, and some herbarium-specimens have lost some or all of them. Furthermore, certain sheets of specimens show but few petals (*MacDaniels*, from Lake Erie, with 10; *Lindheimer*, no. 662, from Comanche Spring, with only 6); and, in transferring Walter's *Nymphaea pentapetala* to *Cyamus*, Pursh said: "A specimen seen in the collection of a gentleman in Carolina ascertains the existence of this formerly doubtful plant." Since we know only a single indigenous species of *Nelumbo* in Atlantic North America, it is probable that Walter had an unusual or a somewhat disintegrated flower. The identity of his two descriptions is otherwise apparent, even to "corolla alba" for both. I am told by those more familiar than I with the plant growing that the flowers are white, sometimes passing to a weak whitish yellow, so that Walter's description of the color was as accurate as that implied in Willdenow's name *Nelumbium luteum*. Walter, however, was not always precise in his descriptions of color. Dr. S. F. Blake calls my attention to Walter's original description of his *Smyrniolum cordatum*, "floribus albis," for a plant which is the type of *Zizia cordata* (Walt.) DC., a species of the small genus known as "Golden Alexanders" because of the brilliant orange-yellow flowers.

Since, however, Walter's inappropriate name for our Water Lotus antedates by 11 years the more appropriate one of Willdenow and since we are allowed no choice in the matter, but must retain the first, even though inappropriate, the name *Nelumbo pentapetala* must join the long list of often misleading but nomenclaturally correct names.¹

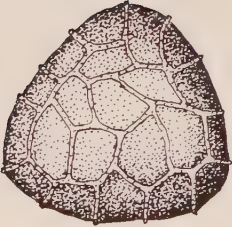
¹ A long list, in our own flora containing, among others, such cases as *Phyllodoce coerulea* for a shrub with crimson or purple flowers; *Dirca palustris* for a shrub of rich, often dry, upland deciduous woods; *Aster nemoralis* for a characteristic species of open sphagnum bogs, inundated pond-margins and peaty barrens; *Solidago nemoralis* for a plant of sun-baked, open habitats; *Oenothera fruticosa* for a short-lived herb; *Ceanothus ovatus* for a shrub with elliptic-lanceolate leaves; *Gentiana quinquefolia* for one of the leafiest of species; *Lycopus uniflorus* for a plant with several whorls of closely crowded flowers; *Benzoin aestivale* for a shrub flowering in March and April; *Rhus Vernix* for a species which is not the lacquer tree; *Berberis canadensis* and *Ligusticum canadense* for plants unknown within hundreds of miles of southernmost Canada; *Lilaeopsis chinensis*, *Conioselinum chinense* and *Asclepias syriaca* for species endemic in Atlantic North America!



L. Selago L.



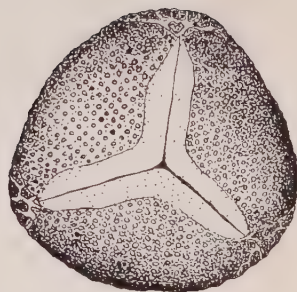
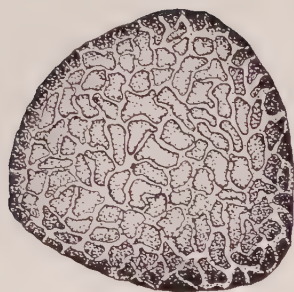
L. lucidulum Michx.



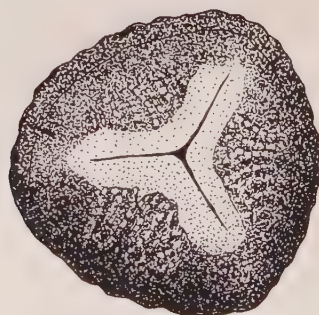
L. annotinum L.



L. cernuum L.



L. inundatum L.

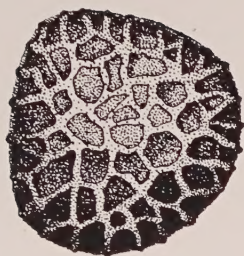


L. alopecuroides L.



L. carolinianum L.

SPORES OF LYCOPODIUM



L. obscurum L.



L. clavatum L.



L. complanatum L.

SPORES OF LYCOPODIUM

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